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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,097	07/08/2003	Zhi-Wen Sun	AMAT/8241/CMP/ECP/RKK	1645

44257 7590 10/17/2006

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EXAMINER	
WONG, EDNA	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

C

Office Action Summary	Application No.	Applicant(s)	
	10/616,097	SUN ET AL.	
	Examiner	Art Unit	
	Edna Wong	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *8-10,20-22,31-33 and 37-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-10,20-22,31-33 and 37-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

This is in response to the Amendment dated September 15, 2006. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Response to Arguments

Claim Rejections - 35 USC § 112

I. Claims **42, 44, 51, 57 and 59** have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The rejection of claims 42, 44, 51, 57 and 59 under 35 U.S.C. 112, first paragraph, has been withdrawn in view of Applicants' amendment.

II. Claims **8-10, 20-22, 31-33 and 37-59** have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection of claims 8-10, 20-22, 31-33 and 37-59 under 35 U.S.C. 112, second paragraph, has been withdrawn in view of Applicants' amendment.

Claim Rejections - 35 USC § 103

I. Claims **8-9 and 37-44** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1) and **Wang et al.** (US Patent No. 6,528,412 B1).

The rejection of claims 8-9 and 37-44 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al. and Wang et al. is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the following reasons:

Applicants state that it follows that it is unfair for the Examiner the misconstrue the disclosure of Miura, which does not teach electroplating a copper seed layer onto a barrier material.

In response, there is no requirement that the teachings be expressly articulated in one or more of the references. The teaching, suggestion or inference can be found not only in the references but also from knowledge generally available to one of ordinary skill in the art. *Ashland Oil v. Delta Resins* 227 USPQ 657 (CAFC 1985). The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. *In re McLaughlin* 170 USPQ 209 (CCPA 19710; *In re Rosselet* 146 USPQ 183 (CCPA 1960). References are evaluated by what they collectively suggest to one versed in the art, rather than by their specific disclosures. *In re Simon* 174 USPQ 114 (CCPA 1972); *In re Richman* 165 USPQ 509,

514 (CCPA 1970).

Furthermore, during patent examination, the pending claim must be given their broadest most reasonable interpretation. The broadest reasonable interpretation of the claims must also be consistent with the interpretation that one skilled on the art would reach (MPEP § 2111).

One skilled on the art would have considered that covering the exposed surfaces within the interconnect opening by electrolytic copper plating would have been depositing a part the seed layer.

Applicants state that the evidence proffered by the Examiner is inadequate to support the assertion that the seed layer deposited on the surface of a silicon wafer by PVD or CVD techniques prior to the application of electrolytic copper plating, as disclosed by Miura, is equivalent to a method for depositing a copper-containing seed layer onto a barrier material layer by an electroplating technique.

In response, using PVD and electrolytic copper plating to deposit the copper seed layer is equivalent to electroplating the copper seed layer because they would have been doing the same endeavor.

The claims as presently written are open to reinforcing the seed layer and adding thickness within trenches or via holes.

Furthermore, it isn't until dependent claims 37 and 45 where the copper seed layer is required to be deposited on the *entire* barrier surface by electroplating.

Applicants state that the same chemical components are maintained throughout the various steps disclosed by Dubin.

In response, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicants state that the Examiner has failed to show a clear and particular motivation by the skilled artisan to combine Miura and Wang.

In response, Applicants' remarks have been fully considered but they are not deemed to be persuasive.

Applicants state that the Federal Circuit has ruled that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." (In re Fritch at 1784).

In response, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

The Examiner is using Dubin ('821), Wang, Nagai and Dubin ('217) to expand on the teachings disclosed in Miura.

II. Claim **10** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1) and **Wang et al.** (US Patent No. 6,528,412 B1) as applied to claims 8-9 and 37-44 above, and further in view of **Nagai et al.** (US Patent No. 6,709,563 B2).

The rejection of claim 10 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al. and Wang et al. as applied to claims 8-9 and 37-44 above, and further in view of Nagai et al. is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the reasons as discussed above.

Applicants' remarks have been fully considered but they are not deemed to be persuasive.

III. Claims **20-21 and 45-52** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1) and **Wang et al.**

(US Patent No. 6,528,412 B1).

The rejection of claims 20-21 and 45-52 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al. and Wang et al. is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the reasons as discussed above.

Applicants' remarks have been fully considered but they are not deemed to be persuasive.

IV. Claim **22** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1) and **Wang et al.** (US Patent No. 6,528,412 B1) as applied to claims 20-21 and 45-52 above, and further in view of **Nagai et al.** (US Patent No. 6,709,563 B2).

The rejection of claim 22 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al. (US Patent No. 6,432,821 B1) and Wang et al. as applied to claims 20-21 and 45-52 above, and further in view of Nagai et al. is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the reasons as discussed above.

Applicants' remarks have been fully considered but they are not deemed to be persuasive.

V. Claims **31-32 and 53-58** have been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1) and **Wang et al.** (US Patent No. 6,528,412 B1).

The rejection of claims 31-32 and 53-58 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al. and Wang et al. is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the reasons as discussed above.

Applicants' remarks have been fully considered but they are not deemed to be persuasive.

VI. Claim **33** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1) and **Wang et al.** (US Patent No. 6,528,412 B1) as applied to claims 31-32 and 53-58 above, and further in view of **Nagai et al.** (US Patent No. 6,709,563 B2).

The rejection of claim 33 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al. and Wang et al. as applied to claims 31-32 and 53-58 above, and further in view of Nagai et al. is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the reasons as discussed above.

Applicants' remarks have been fully considered but they are not deemed to be persuasive.

VII. Claim **59** has been rejected under 35 U.S.C. 103(a) as being unpatentable over **Miura et al.** (US Patent Application publication No. 2003/0155247 A1) in combination with **Dubin et al.** (US Patent No. 6,432,821 B1), **Wang et al.** (US Patent No. 6,528,412 B1) and **Dubin** (US Patent Application Publication No. 2004/0108217 A1).

The rejection of claim 59 under 35 U.S.C. 103(a) as being unpatentable over Miura et al. in combination with Dubin et al., Wang et al. and Dubin is as applied in the Office Action dated May 15, 2006 and incorporated herein. The rejection has been maintained for the reasons as discussed above.

Applicants' remarks have been fully considered but they are not deemed to be persuasive.

Response to Amendment

Claim Rejections - 35 USC § 112

Claims **39-41, 44 and 52** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 39

line 1, it is unclear which copper solution, "the copper solution" is further limiting.

Is it the first copper solution (from claim 8, line 8) or the second copper solution (from claim 8, line 17).

Claim 40

line 1, it is unclear which electrical bias, "the electrical bias" is further limiting. Is it the first electrical bias (from claim 8, line 13) or the second electrical bias (from claim 8, line 19).

Claim 41

line 1, it is unclear which electrical bias, "the electrical bias" is further limiting. Is it the first electrical bias (from claim 8, line 13) or the second electrical bias (from claim 8, line 19).

Claim 44

line 1, it is unclear what is the relationship between "the barrier layer consists essentially of cobalt, ruthenium, nickel, or tungsten" and the barrier surface selected from the group consisting of a tungsten surface, a tungsten nitride surface, a titanium surface, a titanium nitride surface, a cobalt surface, a ruthenium surface, a nickel surface, and a silver surface recited in claim 8, lines 4-7.

Claim 52

line 1, "the pH value" lacks antecedent basis.

Claim Rejections - 35 USC § 103

I. Claims **8-10 and 37-44** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oskam et al.** (US Patent No. 6,309,969 B1) in combination with **Miura et al.** (US Patent Application Publication No. 2003,/0155247 A1) and **Andricacos et al.** (US Patent No. 6,974,531 B1).

Oskam teaches a method for depositing a copper-containing seed layer onto a barrier layer, comprising:

(a) providing a substrate **100** (= a silicon wafer) having a barrier layer **104** (= a diffusion barrier layer) disposed on a substrate surface, wherein the barrier layer has a barrier surface selected from the group consisting of a tungsten surface, a tungsten nitride surface, a titanium surface, a titanium nitride surface, a cobalt surface, a ruthenium surface, a nickel surface, and a silver surface (= TiN) [col. 6, line 50 to col. 7, line 2; and Fig. 3];

(b) exposing the substrate to a first copper solution **50** (= an electrolytic bath) having a pH value of less than 7 (= a pH in the range of 1.0 to 2.0), wherein the complexed copper ions are derived from a copper source selected from the group consisting of copper citrate, copper borate, copper tartrate, copper oxalate, derivates thereof, and combinations thereof (= $CuCO_3$ $Cu(OH)_2$) [col. 5, lines 9-16]; and

(c) applying a first electrical bias (= a voltage range of –0.4 V to –1.0 V) across the substrate surface to chemically reduce the copper ions (= so that a first growth of copper nuclei **106** are formed) [col. 7, lines 13-32] and to deposit a copper seed layer onto the barrier surface (= the condition subsequent may also occur when a high density of nuclei (e.g., diameters of 20 nm to 150 nm) sufficient for clusters to *coalesce* are formed from the first applied voltage) [col. 7, lines 40-43]; and

(d) depositing a copper bulk-fill layer by:

(i) exposing the substrate to a third copper solution containing free-copper ions (= the concentration of copper ions in the bath); and

(ii) applying a third electrical bias (= a second voltage is applied, preferably between –0.10 V to +0.05 V) across the substrate surface to deposit the copper bulk-fill layer **108** (= a copper layer) onto the copper seed layer (col. 7, lines 44-57; and Fig. 4).

The copper seed layer is deposited on the entire barrier surface (= conditions in the formation of the copper layer) [col. 7, lines 33-43].

The copper solution contains a copper concentration within the range from about 0.02 M to about 0.8 M (= between 0.001 to 1.0 M Cu^{2+}) [col. 5, lines 9-12].

The electrical bias generates a current density of less than about 10 mA/cm^2 across the substrate surface (= a voltage range of –0.4 V to –1.0 V) [col. 7, lines 16-13-23].

The current density is within the range from about 0.5 mA/cm^2 to about 3 mA/cm^2

across the substrate surface(= from a voltage range of –0.4 V to –1.0 V) [col. 7, lines 16-13-23].

The method described by Miura differs from the instant invention because Miura does not disclose the following:

a. Wherein the first copper solution contains complexed copper ions, as recited in claim 8.

Oskam teaches $CuCO_3$ and $Cu(OH)_2$ (col. 5, lines 9-16).

Like Oskam, Miura teaches a process for electroplating copper onto silicon wafers. Miura teaches that copper ions and a complexing agent for the copper ions can be used to serve as the copper salt provided that their anions do not impose adverse effects on the electrolytic copper plating solution (page 2, [0019]). The copper salt includes copper hydroxide, copper carbonate and salts of copper with a complexing agent (page 2, [0020]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the first copper solution described by Oskam with wherein the first copper solution contains complexed copper ions because salts of copper with a complexing agent would have been functionally equivalent as the copper salt in an electrolytic copper plating solution wherein their anions would not have imposed adverse effects on the electrolytic copper plating solution as taught by Miura (page 2, [0019] and [0020]).

b. Depositing a copper gap-fill layer by:

(i) exposing the substrate to a second copper solution containing free-copper ions; and

(ii) applying a second electrical bias across the substrate surface to deposit the copper gap-fill layer onto the copper seed layer, as recited in claim 1.

Like Oskam, Andricacos teaches a process for electroplating copper onto silicon wafers. Andricacos teaches that a dual damascene copper plating comprises a gap fill step (col. 4, lines 17-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method described by Oskam by depositing a copper gap-fill layer by: (i) exposing the substrate to a second copper solution containing free-copper ions; and(ii) applying a second electrical bias across the substrate surface to deposit the copper gap-fill layer onto the copper seed layer because a dual damascene copper plating would have comprised a gap fill step as taught by Andricacos (col. 4, lines 17-26).

Furthermore, one having ordinary skill in the art would have chosen a multi-step electroplating operation so that the process as a whole would have provided a reduction or elimination of voids when filling small openings in an interlayer dielectric film.

c. Wherein at least one leveling agent is added to the second copper solution to form the third copper solution, as recited in claim 10.

Andricacos teaches that copper plating from solutions incorporating additives used to produce level deposits on a rough surface can be used to accomplish superfilling preferred to fill sub micron cavities. The additives include a leveler (col. 8, lines 31-50).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the second copper solution described by Oskam with wherein at least one leveling agent is added to the second copper solution to form the third copper solution because copper plating from solutions incorporating a leveler used to produce level deposits on a rough surface would have accomplished superfilling of sub micron cavities as taught by Andricacos (col. 8, lines 31-50).

d. Wherein the copper source is copper citrate, as recited in claim 38.

Oskam teaches $CuCO_3$ and $Cu(OH)_2$ (col. 5, lines 9-16).

Miura teaches that copper ions and a complexing agent for the copper ions can be used to serve as the copper salt provided that their anions do not impose adverse effects on the electrolytic copper plating solution (page 2, [0019]). The copper salt includes copper hydroxide, copper carbonate and salts of copper with a complexing agent (page 2, [0020]). The complexing agent is citric acid [page 2, [0027]].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the copper source described by Oskam with wherein the copper source is copper citrate because a salt of copper with citric acid

would have been functionally equivalent as the copper salt in an electrolytic copper plating solution wherein their anions would not have imposed adverse effects on the electrolytic copper plating solution as taught by Miura (page 2, [0019] and [0027]).

e. Wherein the copper seed layer has a thickness less than about 200 Å, as recited in claim 42.

The clusters of high density of nuclei (e.g., diameters of 20 nm to 150 nm) coalesced as disclosed by Oskam (col. 7, lines 33-43) inherently has a thickness.

Miura teaches that the seed layer is generally formed to an average thickness of 100 to 200 nm in the flat regions of a silicon wafer and to an average thickness of 10 nm on the inner sides of trenches and vias holes, the thickness can vary significantly with the thinnest part having a thickness less than half the average thickness (page 1, [0007]).

Andricacos teaches a thin seed of about 1 Å to about 600 Å (col. 1, lines 10-14). For a 60 nanometer copper seed, the sheet resistance is still low enough to ensure deposition over the whole substrate surface, although with a non-uniform growth rate in the case of a primary current distribution (page 1, lines 61-64).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the copper seed layer described by Oskam with the copper seed layer has a thickness less than about 200 Å because the thickness is a result-effective variable and one skilled in the art has the skill to calculate thickness that

would have determined the success of the desired reaction to occur, i.e., a sheet resistance that is still low enough to ensure deposition over the whole substrate surface (MPEP § 2141.03 and § 2144.05(II)(B).

f. Wherein the pH value is within a range from about 4.5 to about 6.5, as recited in claim 43.

Oskam teaches a pH in the range of 1.0 to 2.0 (col. 5, lines 14-16).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the pH value described by Oskam with wherein the pH value is within a range from about 4.5 to about 6.5 because it has been held that changes in temperature, *concentration* or both, is not a patentable modification; however, such changes may impart patentability to a process if the ranges claimed produce new and unexpected results which are different in kind and not merely in degree from results of the prior art, such ranges are termed "critical" ranges and Applicant has the burden of proving such criticality; even though Applicant's modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within capabilities of one skilled in the art; more particularly, where general conditions of the claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) and MPEP § 2144.05.

g. Wherein the barrier layer consists essentially of cobalt, ruthenium, nickel or tungsten, as recited in claim 44.

Oskam teaches that a diffusion barrier is well known in the art and may be formed of a variety of transition metals, transition metal alloys, transition metal silicides, metal nitrides, and ternary amorphous alloys. The most common diffusion barriers is use are titanium nitride (TiN) and titanium-tungsten alloy due to their demonstrated ability to effectively reduce copper diffusion (col. 2, lines 26-39).

Andricacos teaches that examples of platable high resistive metal barrier layer are titanium nitride, cobalt, ruthenium, nickel or tungsten (col. 11, lines 11-25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the barrier layer described by Oskam with wherein the barrier layer consists essentially of cobalt, ruthenium, nickel or tungsten because cobalt, ruthenium, nickel or tungsten would have been functionally equivalent as the barrier layer to effectively reduce copper diffusion and are platable high resistive metals as taught by Miura (page 2, [0019] and [0027]).

II. Claims **20-22 and 45-52** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oskam et al.** (US Patent No. 6,309,969 B1) in combination with **Miura et al.** (US Patent Application Publication No. 2003/0155247 A1) and **Andricacos et al.** (US Patent No. 6,974,531 B1).

Oskam, Miura and Andricacos are as applied for reasons as discussed above

and incorporated herein.

III. Claims **31-33 and 53-58** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Oskam et al.** (US Patent No. 6,309,969 B1) in combination with **Miura et al.** (US Patent Application Publication No. 2003/0155247 A1) and **Andricacos et al.** (US Patent No. 6,974,531 B1).

Oskam, Miura and Andricacos are as applied for reasons as discussed above and incorporated herein.

IV. Claim **59** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Oskam et al.** (US Patent No. 6,309,969 B1) in combination with **Miura et al.** (US Patent Application Publication No. 2003/0155247 A1) and **Andricacos et al.** (US Patent No. 6,974,531 B1).

Oskam, Miura and Andricacos are as applied for reasons as discussed above and incorporated herein.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edna Wong
Primary Examiner
Art Unit 1753

EW
October 13, 2006